SEM in Seattle - Design and Construction of the C710 Beacon Hill Station Tunnels

Michael Murray  
_Hatch Mott MacDonal_  

Stephen Redmond  
_Obayashi Corporation_  

Richard Sage  
_Sound Transit_  

Franz Langer  
_Dr. Sauer Corporation_  

Don Phelps  
_Hatch Mott MacDonal_  

Abstract:  
Contract C710 is currently under construction as part of Sound Transit's Link Light Rail connecting downtown Seattle with Sea-Tac Airport. The paper describes the design and construction of the deep mined station under Beacon Hill using the Sequential Excavation Method (SEM), also known as the New Austrian Tunneling Method (NATM).

The 55 m (180 ft) deep binocular station includes platform, concourse, cross-passage and emergency ventilation tunnels together with station egress and ventilation shafts.

The paper describes the geotechnical conditions anticipated and encountered, and the development of the design from the preliminary design stage through the construction stage. Following the construction of a Test Shaft during the final design stage, it was realized that the ground conditions would be difficult, so provision was made for further geotechnical investigations and ground improvement from the surface during the construction stage.

The construction methods and design details are strongly influenced by the need to ensure safety during construction. Excavation sequences include twin-sidewall and single-sidewall drifts. A range of pre-support measures and 'tool-box' items are made available and adopted as necessary.

Details are included on the rates of progress achieved in the safe and successful tunnel construction to date.

Keywords: Puget Lowlands; Cascade Mountains; Olympic Mountains; test shaft; collector tunnels (VECP); platform shift; exploratory drilling; jet grouting; dewatering wells; slurry wall shaft and headhouse; head house and shaft excavation; SEM Construction; barrel vault installation; platform tunnels; soft ground SEM tunnelling; water-charged glacial deposits.